

LABEL RECONCILIATION DEVICE AND METHOD

The purpose of this invention is to provide a means for pharmaceutical and other manufacturers to remove, reconcile, and verify labels that are determined to be faulty from the labeling system prior to the label application point.

CROSS-REFERENCE TO RELATED APPLICATIONS

This patent application is based on Provisional Patent Application Serial No. 60/392,536 filed June 28, 2002, the filing date of which is hereby claimed.

BACKGROUND OF THE INVENTION

There are a number of labeling systems adapted to apply pressure-sensitive labels to articles or containers at a label-applying station. A typical prior art system is illustrated schematically in Figure 1. Labels (1) are carried initially by a web (2) with the adhesive side of the label facing toward the web, and the adhesive holding the label to the web. The labels are delivered to a vacuum drum (7) following stripping from the web (2) at a label pick-up station (5), and deposited on the vacuum drum (7). The vacuum drum (7) continuously advances the stripped labels in a given direction to meet articles to be labeled (3) at a label-applying station (4). Simultaneously, articles to be labeled (3) are continuously advanced past the label applying station (4).

The speed of advance of the articles to be labeled 3 and the speed of advance of the web (2) are sensed continuously by electronic means, and the speed of advance of the web (2) is adjusted as necessary to match the speed of advance of the articles to be labeled (3). In Figure 1, the articles to be labeled (3) are rotating as they contact the adhesive surface of the label at label applying site (4), thereby fixing the label to the article to be labeled (3). Some of the prior art devices utilize a pressure-sensitive labeler with an intermediately moving web. More recent devices utilize a

continuously moving web pressure-sensitive labeler. Typical examples of these various devices will be found in U.S. Patent 4,842,660; U.S. Patent 4,687,535; and U.S. Patent 5,256,239.

The aforementioned patents, while describing effective labeling systems and equipment, are not perfect and, on occasion, "incorrect" or faulty labels may be applied to containers. Incorrect/faulty labels are wrong labels or labels with poor or illegible lot numbers or expiration dates and/or incorrect bar code or part numbers. This is a matter of particular concern to packagers of pharmaceuticals. An incorrectly labeled pharmaceutical container could lead to a costly product recall, and might result in serious injury or even death. The end user relies on the label to take medicine according to a doctor's instructions and could, in fact, be taking the wrong medicine or following wrong directions with adverse results. Accordingly, equipment and systems have been developed for detecting the presence of incorrect/faulty labels. This detection may occur both prior to labeling and subsequent to labeling, or both. U.S. Patent 2,551,364 and U.S. Patent 4,662,971 are examples of labeling equipment that provide error detection prior to application of the labels.

U.S. Patent 5,405,482 describes an advance over the aforementioned patents in that the scanning and removal of incorrect/faulty labels can be conducted without interrupting the essentially continuous operation of the labeling equipment. The label scanner (8) is positioned to "read" the labels while they are still positioned on the carrier web, just prior to the label pick-up station (5) and vacuum roll (7) which will remove the label from the web. A "bad" label-removal unit is positioned between the vacuum roll label pick-up point (5) and the point (4) at which the vacuum roll normally releases and applies a label to a container (3) and is controlled by information from the scanning unit (8) such that when an incorrect label is identified by the scanner, the information is transmitted to and actuates a label-removing device. It is only necessary that the rate and time of

label travel be coordinated so that the label removed is the detected incorrect label and not one of the proper labels. There are some serious drawbacks to the detection system of U.S. Patent 5,405,482. As noted in the patent, the adhesive strength of the label coating overcomes the vacuum strength of the vacuum drum such that the incorrect label is wrapped around the removal roller of the label removal device. These removed labels accumulate on the removal roller and eventually must be removed from the roller by a machine operator. In this regard, see U.S. Patent 5,405,482, column 3, lines 51-54, and column 4, lines 12-14. Because these labels are strongly adhered to each other, they are not readily separated from each other for individual reconciliation and one must depend on the weight of the accumulated, adhered block of labels relative to the weight of a single label for reconciliation purposes, a procedure that is inherently inaccurate and/or inefficient.

The deficiency in the system of U.S. Patent 5,405,482 and all the previously discussed patents is the absence of means for detecting, isolating, and reconciling incorrect/faulty labels prior to label application. In dealing with something as sensitive as pharmaceuticals, one must consider the serious dangers inherent in the fact that any mechanical system may go out of adjustment. Under such circumstances, it is possible that the label removed is not the label that the scanner detected as incorrect, with the result that a correct label is removed and the incorrect/faulty label continues on into the system. In U.S. Patent 5,405,482, at column 4, lines 18-19, it is noted that "unlabeled bottles are easily thereafter identified by operating personnel and may even be reused." While such detection procedures make identification of the skipped unlabeled container relatively easy, they do not provide an easy and efficient reconciliation between incorrect/faulty labels identified and incorrect/faulty labels removed. It is difficult to impossible for the operator to peel off individual labels from the adhered block of accumulated label faults on the label-remover roll

and examine them individually for faults or for reconciliation. Further, by the time the roller has been cleared of the accumulated, adhered "incorrect" or faulty labels, and a reconciliation attempted, a container with an incorrect/faulty label, which through error in the detection process, may be far down the line, and mixed in with the large number of labeled containers coming off the labeling line.

BRIEF SUMMARY OF THE PRESENT INVENTION

The present invention provides all of the advantages of the foregoing patented devices and, in addition, provides a means for accurate, rapid reconciliation between the incorrect/faulty labels scanned and the incorrect/faulty labels removed. The device and system of the present invention further has the capability of being adapted to stop the system automatically in the rare event that an incorrect/faulty label is scanned in advance of application to a container but a correct label has, through inadvertence, been removed, rather than an incorrect/faulty label.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic representation of prior art labeling systems.

Figure 2 illustrates the system of the present invention in an inactive state, i.e. at a time when no incorrect/faulty label has yet been detected or, if detected, the incorrect/faulty label has not yet reached the point of removal..

Figure 3 is an illustration of the present invention in which the label-removal device is activated for the removal of an incorrect/faulty label.

Figure 4 illustrates a preferred embodiment of the present invention.

Figure 5 is a front elevation in partial section of the preferred embodiment of Figure 4, and showing the location of the torque clutch relative to the unwind mechanism.

DETAILED DESCRIPTION OF THE INVENTION

Pressure sensitive labels are fed from a label pick-up station (5) onto a vacuum drum (7) as described above with regard to the prior art. The drum is servo-driven and in synchronization with a container that is traveling down a conveyor system toward label application site (4). The vacuum drum (7) applies the labels to containers (3). Each label is scanned one by one with a vision camera system (8) that detects various printed items on the label. If any of these items is incorrect, the label dispenser at label pick-up station (5) will still dispense the incorrect/faulty label onto the vacuum drum (7) but the incorrect/faulty label will be electronically tracked, even though dispensed along with good labels onto the vacuum drum (7). The tracked, incorrect/faulty label will be removed from the vacuum drum (7) by a suitable pick-off assembly (14) actuating against the paper web, and the picked-off incorrect/faulty label will be delivered and adhered to paper web (9). The pick-off assembly may comprise an actuating arm terminating in a roller, as shown in Figures 2 and 3, or may terminate in a low-friction bearing surface; in either case, the paper web is free to move easily between the unwind spool (10) and the rewind assembly (13). The paper web (9) is fed via the unwind spool (10) and a dancer arm assembly (11) that ensures tension of the paper web between the unwind assembly (12) and the rewind assembly (13). When the pick-off assembly (14) is actuated, it pushes the paper web against adhesive surface of the faulty label on the drum (7). When the pick-off roller assembly (14) is actuated, the unwind dancer arm (11) will release a friction belt, enabling the unwind spool (10) to spin. Vacuum drum (7) will transport the label, and will also drive paper web (9) which will in turn drive the label pick-off roller (14). When an incorrect/faulty label is detected, it is transferred from the vacuum drum onto the paper web (9). Scanner (15) is essentially a counter/rejected label verifier that detects each transferred label to ensure that the label

has been removed from vacuum drum (7) and that the number of labels removed corresponds to the number of incorrect/faulty labels detected. A torque or servo motor rewind system (16) and dancer arm (17) take up the excess web material together with the adhered faulty label that is being pushed by the vacuum drum. After the label is applied to web (9), the pick-off roller assembly (14) is deactivated and returns to its unengaged position. The gap between incorrect labels on the paper web can be determined by the length of time that the pick-off roller assembly (14) is activated. The user can reconcile the incorrect labels visually on the paper web, on the wound web roll, or on the unwound web roll to ensure that the label counters are correct, without the necessity and time associated with separating the stack of incorrect/faulty labels adhering to each other from the take-off roll of the 5,405,482 patent. These rolls may also be used as a permanent record of reconciliations and fault corrections. Optionally, it is possible to replace scanner (15) with a reconciling scanner similar to scanner (8) or use such in addition to scanner (15). In this case, the reconciling scanner would be looking for a correct label mixed in with the incorrect/faulty labels on web (9). When a correct label is detected, the reconciling scanner can send a signal to shut down the line until the error in the labeled containers is correspondingly corrected or otherwise notify the operator of the error.

A preferred embodiment of the present invention is illustrated in Figures 4 and 5. In the embodiment of Figures 2 and 3, the unwind spool 10 and dancer arm assembly 11 co-acted to maintain tension of the paper web between the unwind assembly 12 and the rewind assembly 13. As shown in Figures 4 and 5, dancer arm assembly 11 has been eliminated, and a torque clutch 18 has been added to the unwind assembly 12, thereby providing a simpler and more efficient manner of controlling tension in the paper web.